P2000

Security Management System

hardware installation

and operation

DM-21
authentic Mercury™ intrusion display

Johnson Controls

Other Manufacturers' Documentation

Johnson Controls does not duplicate documentation of other equipment manufacturers. When necessary, Johnson Controls provides documentation that supplements that of other manufacturers. When unpacking your equipment, keep all original manufacturer documentation for reference.

Technical Support

For factory technical support, Johnson Controls authorized field technicians can contact Global Security Solutions by phone at (866) 893-0423 or (414) 524-1214, or by email at support.globalsecuritysolutions@jci.com. They can also call the Field Support Center at (800) 524-1330 or (414) 524-5000 and use options 6, 1, 7.

Customers who require technical support or who have other support needs (maintenance contracts or on-site field support) should contact their local Johnson Controls office; visit http://www.johnsoncontrols.com/content/us/en/locations.html to find your local office.

Acknowledgments

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Declarations of Conformity

United States: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada: CAN ICES-3 (A)/NMB-3(A)

European Union: This product complies with the requirements of the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EEC.

This equipment must not be modified for any reason and it must be installed as stated in the Manufacturer's instruction. If this shipment (or any part thereof) is supplied as second-hand equipment, equipment for sale outside the European Economic Area or as spare parts for either a single unit or system, it is not covered by the Directives.

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UNDERWRITERS LABORATORIES COMPLIANCE VERIFICATION SHEET

The following model number is listed under Underwriters Laboratories UL 1076 for Proprietary Burglar Alarm Units and Systems, UL 294 for Access Control Systems Units and Underwriters Laboratories of Canada ULC/ORD-C1076-86.

<div align="center">

DM-21

</div>

When installed at the site the following requirements must be met to comply with these standards.

1. Transient protection devices that are installed must not be removed or defeated.

2. Do not connect equipment to an AC power source that is controlled by a switch.

3. A visual or audible indicator shall be mounted adjacent to the DM-21 to indicate to the attendant that the closing signal was received by the central supervising station. Refer to P2000 Software User Manual version 3.12, P/N 24-10685-157, Appendix J for configuration details.

4. For a UL 294 Listed system the following Listed readers may be used.

Manufacturer	Models
HID Global Corp.	5355, R40N, R40T, RK40N, RK40T, RP40N, RP40T, RPK40N, RPK40T All models may be followed by additional suffixes
Mercury Security Corp.	MR-5, MR-20

5. The maximum Wiegand line impedance is 8 ohms, representing 22 AWG @ 500 feet.

6. Suitable for use with the model P2K-nnn-UL-x Security Management System, where **n** can be any number 0 through 9 and where **x** can be any three letters A through Z.

DM-21 MERCURY INTRUSION DISPLAY

This document provides hardware installation and setup instructions for DM-21, the authentic Mercury™ intrusion display. This document is divided into the following sections:

GENERAL INFORMATION

The DM-21 integrates a 2 line x 16 character back-lit LCD display with a 16-position keypad and a reader port. This highly functional I/O device can communicate to:

- Controller's serial I/O port via a two-wire RS-485 using MSP1 protocol. The total cable length is limited to 4,000 feet (1,220 meters).

NOTE: The terms "DM-21" and "MRDT" mean the same thing and are used interchangeably in this document.

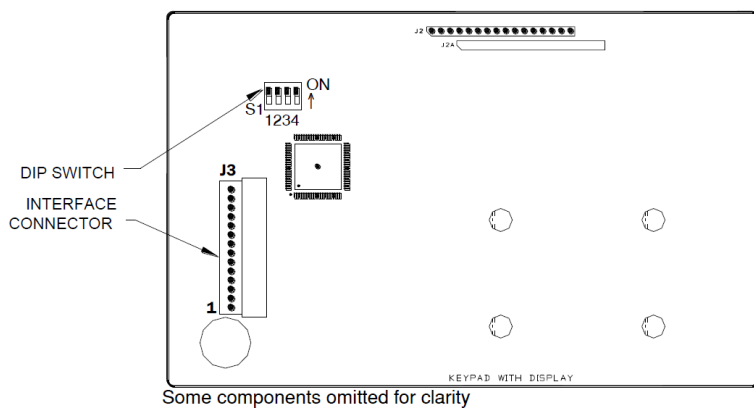Figure 1 illustrates the DM-21 intrusion display hardware.
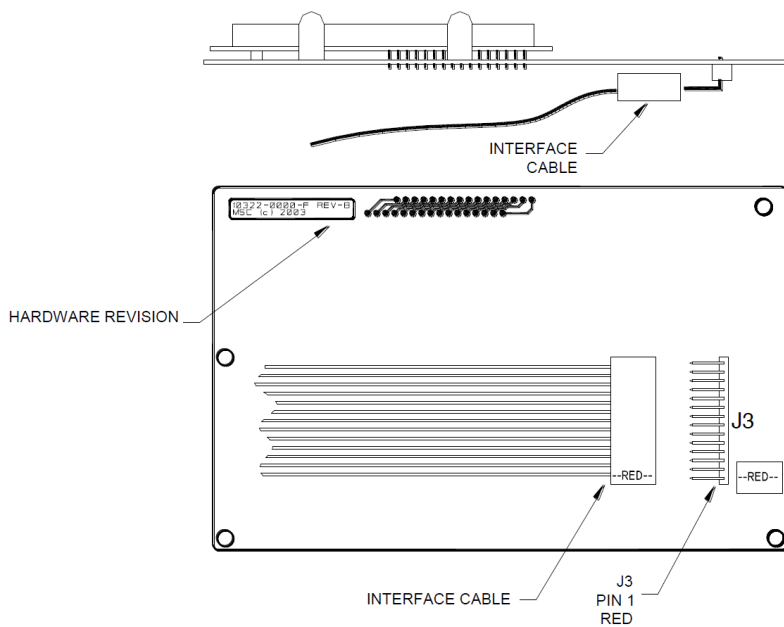

Figure 1: DM-21 Hardware

Figure 2: DM-21 Hardware Rear and Side View

MOUNTING INFORMATION

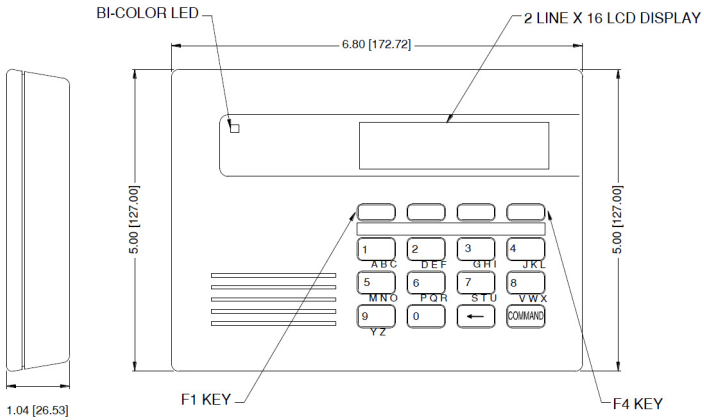Figure 3 shows the front and side view of the DM-21.

Figure 3: Front and Side View

Figure 4 shows the mounting dimensions of the DM-21.

Figure 4: Mounting Dimensions

WIRING INFORMATION

This sections covers the following:

- Cable Routing
- Input Power
- Communication Wiring
- Optional External Reader Wiring

Cable Routing

The cables should run in grounded conduit or at least two feet from AC power, fluorescent lights, or other high energy sources.

IMPORTANT: All data cables should be physically separated from power lines. If conduit is used, do not run data cables in the same conduit as power cables or certain door strike cables, e.g. strike voltage greater than 42V or Magnetic door locks without EMI suppression.

All cables must conform with the following regulations:

- National Electrical Code
- NFPA 70
- Local electrical codes
- Canadian Electric Code C22.1 (installations in Canada)
- BSI Standard BS7671, latest edition (installations in Great Britain)

Cabling should be made using good wiring practices and should be long enough to allow service loops at their terminations in the enclosure.

Input Power

The DM-21 requires 12 VDC ±15% for power and the power source must be filtered.

Communication Wiring

Communication protocols supported:

- MSP1 – via a half duplex multidrop two-wire RS-485 interface from controller's SIO communication bus. Connects to SIO serial communication bus; TR+ and TR–. The total cable length is limited to 4,000 feet (1,220 meters).

NOTE: The CKM-EP1501 reader port 1 may be configured as a standard reader port or a RS485 downstream communications port. The RS485 downstream communications port only supports MSP1 protocol.

Interface Wiring Harness Configuration

Table 1: Interface Wiring Harness Configuration

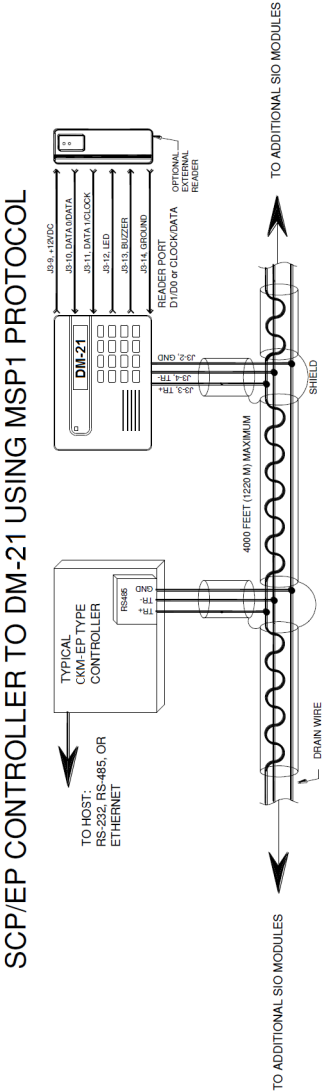| J3	Color	Signal Description	Connections
1	Red	12VDC Input Only	Input Power Connections
2	Black	Ground	
3	Blue	RS-485 TR+ (D1/CLK)	SIO Serial Communications Bus or Reader Port (Series 2)
4	Gray	RS-485 TR- (D0/DAT)	
5	Green	TTL data, Connect to MR-52 DATA 0	Series 1 CKM-MR52 Reader Port Connections TTL Signaling
6	White	TTL data, Connect to MR-52 DATA 1	
7	Brown	TTL data, Connect to MR-52 LED	
8	Orange	TTL data, Connect to MR-52 Buzzer	
9	Red	12VDC Pass Through for External Reader	Optional external reader connections
10	Green	Reader DATA or DATA 0	
11	White	Reader CLOCK or DATA 1	
12	Brown	Reader LED	
13	Orange	Reader Buzzer	
14	Black	Ground	

Figure 5: Controller to DM-21 Communications

Optional External Reader Wiring

The DM-21 supports the connection of a standard reader. This external reader is connected to J3 pins 9 through 14. The power for this reader can be passed through from the 12 VDC input power of the DM-21. D1/D0 and CLOCK/DATA signaling is supported as well as the LED and buzzer. This reader port configuration is set via the host software. Door monitoring inputs and the door strike relay are defined on another device (SIO), if required. The total cable length is limited to 500 feet (152 meters).

SETUP INFORMATION

Table 2: Jumpers

Jumper	Description
J1, J5, J6	Factory use only. Always open.

Table 3: DIP Switches

S1-1	S1-2	S1-3	S1-4	Description
OFF				RS-485 – No termination
ON				RS-485 – 120 ohms termination
	OFF			Use configuration settings
	ON			Forces RS-485, MSP1, 38400 baud & address 31
		OFF		Allow software configuration at startup
		ON		Disable software configuration at startup
			OFF	Not used and set to OFF

Table 4: DIP Switches Description

Switch	Description
S1-1	Follow proper termination practices to insure correct operation. If the DM-21 is the last device on the RS-485 bus, set the termination to ON.
S1-2	Use for testing. This switch forces RS-485, MSP1, 38,400 baud and address 31. DM-21 displays the current saved configuration when in the configuration mode.
S1-3	Disables the ability to use the keypad for changing the configuration when set to ON. This decreases the possibility of unauthorized persons from altering the configuration.
S1-4	Factory use only, set to OFF.

SOFTWARE CONFIGURATION

Firmware revision 1.62.0 and higher supports the following communication protocols:

- MSP1
- Reader Port (TTL)

PowerUp screen

The DM-21 displays the PowerUp screen when power is applied:

```
Press Two Key
↓ For Set Up ↓
```

Press **F1** and **F4** keys to enter the configuration mode, otherwise the unit initializes normally.

Configuration Mode

```
0000047582-1.62B
↓ EXIT Configure ↓
```

The first line displays the unit's serial number, firmware revision, and assembly revision.

The second line prompts to **EXIT** configuration mode (press **F1**) or enter the **CONFIGURE** mode (press **F4**).

Prompting Sequence

When you make your entry, after approximately 3 seconds you will be prompted to accept or change the entered value.

If you do not respond to this prompt within 2 minutes, the DM-21 returns to the PowerUp Complete screen.

Comm

1=RS485 Select RS485 to use MSP1 protocol.

2=Rdr Port Select Rdr (Reader) to connected to a Series 1 CKM-MR52 reader port.

Protocol

Protocol is bypassed if Rdr Port was selected.

1=MSP1 Select MSP1 to connect to:
     - RS485 downstream communications port.
     - Series 2 MR-50 (firmware revision 1.24.0 and higher) or
       Series 2 MR-52 (firmware revision 1.23.0 and higher)
       reader port.
     - CKM-EP1501 or CKM-EP1502 reader port.

The CKM-EP1501 reader port 1 may be configured as a standard reader port or a RS485 downstream communications port.

Baud Rate

Baud Rate is bypassed if Rdr Port was selected.

1=9600 Select for 9600 baud (default for standard reader port using MSP1 protocol)

2=19.2 Select for 19200 baud

3=38.4 Select for 38,400 baud

4=115.2 Select for 115,200 baud *

Comm Address

Comm Address is bypassed if Rdr Port was selected.

Enter communication address: 00 through 31 (must enter two digits). Use address 00 if connected to a standard reader port.

Back Light

Enter the number of seconds the back lights are illuminated after the last key is pressed: 00–99 seconds (must enter two digits).

00 = always off
99 = always on

LED

Selects the LED drive type to match the optional external reader connected to the reader port.

1-Wire	Standard one-wire interface (High = Red, Low = Green)
2-Wire	Brown wire controls Red LED (High = Off, Low = On) Orange wire controls Green LED (High = Off, Low = On) (No Buzzer)
2W/Special	Use this mode when interfacing to Dorado (HID) reader model 780.

Save Configure

Select **Yes** to save the configuration. The PowerUp Complete screen appears and the DM-21 initializes.

Select **No** to discard any changes to the configuration and go back to the PowerUp screen.

STATUS, OFFLINE, LED/BUZZER, AND DOWNLOADING DISPLAYS

Status Display

At anytime while DM-21 is running, except in the configuration mode, the status display may be evoked by simultaneously pressing the arrow and command keys. The status appears for about 10 seconds.

Status Display example:

```
0000074582 1621B
485MSP1 38400 05
```

The top line contains the 10-digit serial number, firmware revision, and the hardware assembly version.

The bottom line contains the communication type, baud rate, and communication address.

Communication type: Rdr Port or 485MSP1

Baud rate: 9600, 19200, 38400, or 115200

Address = 00–31

Offline Display

When the DM-21 is not communicating to the controller communication port or the reader port, the following appears:

```
"ooo        "
"        ooo"
```

If the SIO of the reader port that the DM-21 is connected to is offline with the controller, the following appears:

```
"...        "
"        ..."
```

Bi-color LED/Buzzer

The LED and buzzer are controlled by the LED and buzzer input except as described in the Note in Firmware Downloading Display on page 12.

Firmware Downloading Display

If the DM-21 is power up with corrupted or missing application code the following message appears:

```
FirmwareRequired
```

The application code must be downloaded to the DM-21.

When the DM-21 is receiving downloaded firmware, the following appears:

```
"Downloading x"
```

Where x = period, lower case o, and zero appear in sequence.

NOTE: When in either of the above modes, the LED flashes: 0.1 second Green, 0.1 second Off.

After firmware download has completed, the PowerUp screen appears and the DM-21 initializes.

SPECIFICATIONS

Use this interface in low voltage, Class 2 circuits only.

Table 5: DM-21 Specifications

Category	Description
Primary Power	Voltage: 12 VDC±15%
	Current: 175 mA (terminal only, does not include external reader)
Reader Port	
Power	Pass Through
Interface	Two-wire, Clock/Data or Data 1/Data 0
LED control	Two-wire or one-wire bi-color
Buzzer Control	Available only in 1-wire LED control mode
Communication	
RS-485	Serial I/O port: 4,000 feet (1,220 meters) max. 22 or 24 AWG, 120 ohms impedance
	Reader port: 2,000 feet (610 meters) max. 22 or 24 AWG, 120 ohms impedance
TTL	500 feet (152 m) max, 18 AWG

Table 5: DM-21 Specifications

Category	Description
LED and Buzzer Inputs	
LED input	One-wire mode: input not driven: LEDs Off
	input > 3.5 VDC: Red LED On
	input < 0.8 VDC: Green LED On
	Two-wire mode: input < 0.8 VDC: Red LED on
Buzzer/LED	One-wire mode: input not driven or > 3.5 VDC: buzzer Off
	input < 0.8 VDC: buzzer On
	Two-wire mode: input < 0.8 VDC: Green LED On
Environmental	
Temperature	-4° to 158°F (-20° to +70°C) storage, 32° to 120°F (0° to 49°C) operating
Humidity	10 to 95% RHNC
Mechanical	
Dimensions (W x L x D)	6.75 in. x 5 in. x 1 in.(17.2 cm x 12.7 cm L x 2.5 cm)
Weight	14 oz. (400 g) nominal
Mounting	Surface mount or a three-gang box

MAINTENANCE

Impaired Performance

Following is a list of the impaired performance conditions:

- Unit environment not as specified
- Unit power not as specified
- Cable type and length not as specified

Test Procedure

To check for proper operation of the device:

1. Verify the display shows Johnson Controls.

2. Enter a valid user profile and verify that the display shows "Valid".

3. Press F4 and verity that the status reflects the system state.

4. After access time expires, verify that no commands are accepted by the system.

OPERATION

When a you access a keypad, you can perform commands for Intrusion Zones and Intrusion Areas that are defined in the associated controller.

To use the keypad, the keypad terminal must be associated with an Access Group that is assigned to you. Like for card access terminals, the time period during which the terminal is accessible is defined using P2000 timezones. If the Access Group the keypad terminal is not explicitly associated with a Time Zone, then the system uses the Access Group's default timezone.

In order for an Access Group to be able to grant access to the keypad terminal, the associated P2000 timezone must be referenced in the panel's timezone record.

NOTE: We recommended, that you associate the keypad terminal is with a maximum of two Access Groups.

These commands require the user to select the Intrusion Area and/or Intrusion Zone using the standard Mercury keypad features.

The DM-21 keypad only allows access to the first 99 Intrusion Areas, as the commands are limited to a two digit Intrusion Area identification number.

The function keys **F1** to **F4** work as follows:

- **F1** arms the default Intrusion Area
- **F2** disarms the default Intrusion Area
- **F3** allows the selection of an Intrusion Zones of the default Intrusion Area to be bypassed
- **F4** allows reviewing the Intrusion Zone status of zones associated with the default Intrusion Area

The default Intrusion Area is the area that has been assigned the number 1 during Intrusion Areas configuration.

To enable you to control areas other then the default Intrusion Area, the system provides a user command that can be activated by entering the command:

*3344iic#

Where:

- **ii** is the two digit Intrusion Area number. To enter a single digit Intrusion Area number (from 1 to 9), prefix it with a zero (0).
- **c** is the command identifier.
  The authorized command numbers are:
  0 - Status Info
  1 - Disarm
  2 - Arm Away
  6 - Bypass Control

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